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The frequency of hypertension and contributing variables among hospital staff

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Abstract

Background: Hypertension (HT) is a prevalent, serious condition that often remains undiagnosed until severe complications occur, such as heart attacks or strokes. Globally, hypertension affects over 1.13 billion people, contributing significantly to mortality and healthcare costs. Occupational factors, including work-related stress, long hours, and physical strain, contribute to the high prevalence of hypertension among healthcare workers. Despite the known risks, research on hypertension among healthcare workers. This study aims to assess the prevalence of hypertension among university hospital staff and identify key socio-demographic and occupational factors influencing its prevalence.

Methods: This study involving 3,500 hospital staff from a large university hospital. Data were collected during an annual health examination, including socio-demographic information, medical history, blood pressure, and anthropometric measurements. Hypertension was defined as systolic blood pressure ≥140 mmHg and/or diastolic blood pressure ≥90 mmHg. The study categorized participants by job role, age, marital status, education, smoking, alcohol consumption, and other occupational factors. Statistical analyses, including logistic regression, were performed to assess associations between hypertension and these variables.

Results: The overall prevalence of hypertension was 14.8%, with 65.8% of affected individuals having a known history of the condition. Higher prevalence was found in men, individuals aged 60 and above, and those with higher BMI. Among job roles, administrative staff had the highest hypertension prevalence (76.9%), followed by other roles such as technicians and nurses. Significant occupational risk factors included longer work tenure, non-shift work, and permanent employment. Logistic regression identified male gender, age ≥60, and obesity as independent risk factors for hypertension.

Conclusion: The study underscores the influence of socio-demographic and occupational factors on hypertension prevalence among healthcare workers. Men, older hospital staff , and those with obesity were identified as high-risk groups. Targeted interventions, including lifestyle modifications, early detection, and management programs, are essential to address hypertension in these populations. Increasing awareness and providing tailored healthcare strategies for high-risk groups could significantly reduce the burden of hypertension in hospital settings.

Introduction

Hypertension (HT) is a prevalent and serious medical condition that often leads to severe health complications. As a largely asymptomatic disease, it typically goes unnoticed in its early stages, only becoming apparent when critical issues such as heart attacks, strokes, or chronic kidney

disease arise (1,2). A global study assessing the prevalence of hypertension involving 19.1 million participants found that despite regional variations, the global prevalence has increased over the past four decades, with the number of individuals affected rising by 90%, reaching 1.13 billion by 2015 (3). It is estimated that hypertension is responsible for approximately 7.5 million deaths annually, accounting for 12.8% of all deaths worldwide (4). Furthermore, by 2025, it is predicted that 75% of the global hypertensive population will reside in developing countries (5). The economic burden of hypertension is estimated at around 370 billion dollars, representing 10% of total global healthcare expenditures (6).

the prevalence of hypertension among individuals aged 15 and older was 16.1% in 2014, making it the third most common health condition (7). The Hypertension Prevalence study (PatenT-2012) reported a hypertension prevalence of 30.3% among individuals aged 18 and above. The rates varied by age group, with 5% prevalence in the 18–29 age group, 11.5% in the 30–39 group, 29.7% in the 40–49 group, 53.6% in the 50–59 group, 67.9% in the 60–69 group, 85.2% in the 70–79 group, and 76.2% in those aged 80 and above (2).

Hypertension is influenced by multiple risk factors, including age, geographic location, genetics, socioeconomic status, ethnicity, diet, and lifestyle. Occupational factors also play a significant role in the development of hypertension (8). The prevalence of hypertension varies across different occupational groups, with studies reporting rates of 39.3% among bankers and 27% among police officers (9,10), while other studies found hypertension rates of 26% and 21.3% among hospital hospital staff (11,12).

Healthcare workers face numerous stress-related risks, including long working hours, high workload, time pressures, demanding tasks, lack of breaks, monotonous routines, and poor working conditions. Additionally, healthcare workers often experience physical strain from standing for extended periods, insomnia during night shifts, and irregular eating habits due to their work demands. Hospitals, with their high levels of occupational risks, are often classified as “very dangerous workplaces.” Despite this, research on the prevalence of hypertension among healthcare workers remains limited. Understanding the prevalence of hypertension across various occupational groups is essential for developing effective prevention and treatment strategies. This study aims to assess the prevalence of hypertension among hospital hospital staff and explore its relationship with demographic and occupational factors.

Methods

This study included all hospital staff who participated in the annual health examination , the study included all 3,500 hospital staff.

hospital staff were invited to participate in the annual health screening. Two physicians and two nurses from the occupational health and safety unit conducted the examinations and measurements. Following the annual examination, blood pressure and anthropometric measurements were taken. Healthcare staff were trained to follow standardized protocols for blood pressure and anthropometric measurements.

Data were collected from a detailed anamnesis form, which included socio-demographic information, educational background, employment type, monthly work hours, job position, years of service, hospital unit, shift work, and other relevant data. After the interview, weight and height were measured to calculate the body mass index (BMI). Height was measured without shoes, with the heels against the wall, back straight, and the head in a neutral position. Weight was measured with excess clothing and shoes removed. BMI was calculated by dividing the weight in kilograms (kg) by the square of the height in meters (m^2). Participants were categorized based on BMI as normal weight (BMI <25 kg/m^2), overweight ($25 \leq$ BMI <30 kg/m^2), or obese (BMI ≥ 30 kg/m^2).

Blood pressure measurements were taken using a digital monitor (Braun ExactFit™ 3 - BP6000) with an appropriately sized cuff for the participant's arm. The device was calibrated at least every six months by comparing it to mercury manometers. Participants were instructed to refrain from smoking, drinking tea or coffee, or consuming caffeine for 30 minutes before the measurements.

Blood pressure was measured twice on the right arm of each participant while seated, following at least ten minutes of rest. The mean of the two measurements was used. Individuals diagnosed with hypertension and on antihypertensive medication, or those with a systolic blood pressure ≥140 mmHg and/or diastolic blood pressure ≥90 mmHg, were classified as hypertensive (13). Hospital staff were categorized into four groups based on their roles: a) physicians, b) non-physician healthcare personnel (nurses, technicians, laboratory staff, pharmacists, and dieticians), c) administrative staff, and d) other hospital staff .

Statistical Analysis

Data were analyzed using SPSS v18.0 (SPSS Inc., Chicago, USA). Descriptive statistics for categorical variables were expressed as frequency and percentage (%), while numerical variables were presented as mean ± standard deviation or median (range). Chi-square tests were used for comparing independent categorical variables. For comparisons of numerical variables between two groups, either Student's t-test or Mann-Whitney U test was employed, while one-way ANOVA or Kruskal-Wallis tests were used for multi-group comparisons. A logistic regression model was applied for multivariate analysis. The statistical significance threshold was set at $P < 0.05$.

Results

The study involved 3,500 participants, with (66.5%) women and (33.5%) men. The average age was 39.8 ± 10 years, with women averaging 38.76 ± 9.32 years and men 41.89 ± 11.17 years. Demographic details and educational background are presented in Table 1. A notable difference in hypertension prevalence between men and women was observed ($P < 0.05$). The highest prevalence of hypertension was found in individuals aged 60 years and older ($P < 0.001$). Most participants were married, and hypertension was more common among this group ($P < 0.001$). Among participants, 78.7% had a Bachelor's degree or higher, 10.2% had an associate degree, and 11.1% had a high school diploma or lower. The highest prevalence of hypertension occurred in those with a high school education or less ($P < 0.001$). The smoking rate was 35%, and alcohol consumption was reported by 28.3% of participants. A significant association was found between hypertension and smoking or alcohol consumption ($P < 0.01$). Nearly half (48.9%) of the participants had a BMI below 25, and the frequency of hypertension rose with increasing BMI ($P < 0.001$).

Among those aged 40 and above, 57.2% of men and 44.9% of women were represented. The breakdown by marital status revealed that 26.8% of singles and 58.9% of married individuals had hypertension. The distribution was also assessed by job role: 41% of physicians, 35.3% of nurses, 76% of administrative staff, 61.9% of technicians, and 43% of hospital staff in non-surgical departments had hypertension. Higher prevalence was observed in hospital staff working in administrative (76.9%) and other (68.3%) units.

Regarding job position, 56.4% of the hospital staff were physicians, 31.5% were non-physician healthcare workers (including nurses, technicians, laboratory personnel, pharmacists, and dietitians), 11.4% were administrative staff, and 0.7% were categorized as other staff (e.g., cleaners, drivers, and engineers). A significant link was found between hospital staff ' positions and hypertension prevalence ($P < 0.001$), with administrative staff having a higher prevalence. The prevalence of hypertension was also higher among those working in administrative roles ($P < 0.001$). The majority of hospital staff (43.4%) had worked in their current position for 1–10 years, and hypertension risk increased with longer tenure ($P < 0.001$). Those not working shifts (91.1%) and those not working night shifts (61.5%) had a significantly higher incidence of hypertension ($P < 0.001$ for both). Hospital staff working fewer than 160 hours per month also had a higher prevalence of hypertension ($P < 0.001$). A large proportion (89.7%) of the workers were permanent hospital staff , and hypertension was more common in this group compared to those on contract ($P < 0.001$).

The overall prevalence of hypertension in the study was 14.8%. Of those, 65.8% had a known history of hypertension, while 34.2% were unaware of their condition despite having systolic blood pressure ≥140 mmHg and/or diastolic blood pressure ≥90 mmHg. Among those with a known history of hypertension, 88.2% were using antihypertensive medication.

To identify the most significant work-related factors contributing to hypertension prevalence, a logistic regression analysis was conducted, including variables such as gender, marital status, age, education, smoking, alcohol consumption, BMI, job position, department, shift work, night shifts, monthly working hours, and type of employment .

Table 1. Demographic characteristics of workers and frequency of hypertension

Characteristics	(%[×])	(%[××])	P
Gender			<0.001
Male	(33.5)	(23.2)	
Female	(66.5)	(10.6)	
Age			<0.001
<30	(20.9)	(2.9)	
30–39	(29.9)	(6.2)	
40–49	(30.3)	(17.7)	
50–59	(15.2)	(33.3)	
≥60	(3.4)	(57.3)	
Marital Status			<0.001
Single	(30.7)	(8.4)	
Married	(69.3)	(17.6)	
Education			<0.001
High school or below	(11.1)	(27.9)	
Associate degree	(10.2)	(15.5)	
Bachelor's or higher	(78.7)	(12.9)	
Smoking			<0.01
Yes	(35)	(16.9)	
No	(65)	(13.7)	
Alcohol Consumption			<0.01
Yes	(28.3)	(17.9)	
No	(71.7)	(13.6)	
BMI			<0.001
<25	(48.9)	(6.3)	
25≤ <30	(36)	(19.1)	
≥30	(14.9)	(32.6)	

[×] column percentage

[××] row percentage

Discussion

In this study, the hypertension prevalence among hospital hospital staff was found to be 14.8%, which is lower than figures reported in Brazil but higher than those found in hospital workers in Spain (11, 14). The prevalence is comparable to the general population (2, 7). According to 2014 data from the Statistical Institute, hypertension among individuals aged 15 and older was reported at 16.1%, with another study showing a rate of 30.3% for those aged 18 or older (2, 7). Studies from various Asian countries report higher rates, such as 33.7% in South Korea and 27.8% in Malaysia (15, 16), while the average prevalence in some European countries is 44%, and in North America, it stands at 28% (17).

The incidence of hypertension typically rises with age, with a more notable increase after the age of 40 (18). In this study, nearly half of the participants were over 40, and age was identified as an

independent risk factor for hypertension. Among individuals aged 40–49, one in six had hypertension, and one in three individuals aged 50–59 were hypertensive. As hypertension prevalence increases significantly in those over 40, they should be prioritized for regular screening. Hypertension was notably more prevalent among males (23.2%) compared to females (10.6%), and age was again a critical risk factor in the logistic regression analysis. This finding aligns with studies conducted in Greece, Brazil, and India, which similarly report higher hypertension rates in men (19, 11, 20). In women, hypertension rates increased with age, potentially due to hormonal changes following menopause (21). The study also observed that marital status was linked to hypertension, with higher prevalence among married individuals. Although the exact mechanisms are not fully understood, factors such as psychopathological influences, neuroendocrine pathways, health behaviors, and immune responses may play a role (22). These findings were consistent with a study by Onwuchekwa et al. (23), which also found lower hypertension prevalence among unmarried individuals.

Education level, often associated with socio-economic status, affects lifestyle choices such as nutrition and physical activity. Previous research has shown that hypertension incidence tends to decrease as educational attainment increases (11). In our study, most participants were university graduates, and the prevalence of hypertension decreased with higher educational levels. While education level itself was not identified as a significant risk factor in our logistic analysis, the disparity in hypertension prevalence across educational groups is noteworthy. Furthermore, approximately one-third of participants had a history of smoking and alcohol consumption. The smoking rate observed in this study was consistent with that of other hospital employee studies. Smoking increases blood pressure through vasoconstriction caused by nicotine and other chemicals, while alcohol consumption also elevates hypertension risk. Studies have shown that smokers are 1.3 times more likely to develop hypertension, while alcohol users face a 1.23 times higher risk (24). Similarly, this study found a significant association between smoking, alcohol use, and hypertension.

In terms of body mass index (BMI), overweight individuals were twice as likely to develop hypertension, and the risk increased more than fourfold in obese individuals compared to those with normal weight. Over half of the hospital staff in this study had elevated BMI, likely due to unhealthy lifestyle factors. Hospital workers, in particular, may face irregular eating habits, reduced physical activity, and high levels of stress due to work intensity, shift patterns, and night work. The relationship between BMI and hypertension aligns with findings from Rampal et al. (16), which also showed a higher incidence of hypertension among those with increased BMI. Hypertension was more prevalent among hospital staff in administrative positions, likely because they tend to be older and are often under higher stress. This is supported by research showing that work-related stress factors, such as decision-making authority, psychological demands, overwork, and tight deadlines, can significantly increase hypertension risk (25). A study on white-collar workers found a strong correlation between long-term mental stress and hypertension (24). Administrative staff members, in particular, face more hierarchical pressures and less decision-making freedom, which may contribute to higher stress and, consequently, higher rates of hypertension.

In our study, the prevalence of hypertension was higher among permanent hospital staff compared to those on contract. This might be due to the younger age of contract workers, as only 2.9% of them were over 40, which could explain the lower hypertension rates observed in this group (29, 30).

Contrary to some studies suggesting that shift work contributes to hypertension by disrupting the body's natural rhythms, this study found no significant relationship between shift work and hypertension. Previous research has also produced mixed results on this topic. Similar to our findings, Sfreddo et al. (31) reported no significant link between shift work and blood pressure

levels in nurses. Interestingly, hypertension was more common among those working more than 160 hours per month on average. Various studies have reported conflicting views on the relationship between work hours and hypertension (32–34). The group working the longest hours and most night shifts in our study consisted of younger hospital staff , such as assistant doctors and nurses. As workers age, their involvement in shift work, night work, and long hours tends to decrease, which corresponds with our findings.

While various occupational factors were statistically linked to hypertension, logistic regression analysis revealed that gender, age, and BMI had the most significant influence on the likelihood of developing hypertension.

This study has some limitations. Blood pressure measurements were only taken on a single occasion, which may have led to an overestimation of hypertension prevalence due to temporary increases in blood pressure. However, many studies of this nature rely on single-day measurements. Additionally, there may be inaccuracies in the diagnosis of hypertension, particularly among those who were unaware of their condition.

Conclusion

The findings of this study highlight the significant impact of socio-demographic and occupational factors on hypertension prevalence, emphasizing the need for targeted interventions to prevent and manage hypertension among healthcare workers. Specifically, high-risk groups, including men, older hospital staff , and those with obesity, should be prioritized for interventions. These programs should promote healthier lifestyles, such as proper nutrition and physical activity, and focus on early detection and management of hypertension. Moreover, increasing awareness about hypertension will be essential in ensuring effective control and prevention.

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